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Ref. No.: [redacted] 24/2/59)

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3RD REISSUE

"KVANT's" INFORMATION ON A METHOD OF SEPARATION OF "ĒNORMAZ" (1943)

From: NEW YORK

To: MOSCOW

Nos.: 972, 979, 983 22-23 June 1943

[3-part message complete]

[PART I] Information from "KVANT"[i]. Translated from the English.

The basic idea for a method of separation of "ĒNORMAZ"[ii] consists in repeated [1 group unrecovered] distillation by sublimation (vaporisation from a crystal[C% line] state) and rapid condensation of vapours. With the specified [C% components] the degree[iii] of vaporisation of chemically[iv] [2 groups unrecovered] identical molecules (but different in mass) is inversely proportional to the square root of the mass and directly proportional to the partial vapour pressure sustained by a molecule without condensation. On the other hand the partial vapour pressure of such molecules, in accordance with quantum mechanics, is inversely proportional to the cube of the square root of the mass. Consequently the speeds at which two isotopic molecules [7 groups unrecovered] will be proportional to the square

[19 groups unrecovered]

[Continued overleaf]

[redacted]

[3 pages]

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m_0 is the mass of the light molecules

m_1 is the mass of the heavy molecules

then: $\beta = \left(\frac{m_0}{m_1}\right)^2$.[v]

$ax = \frac{q^0(x)}{q^0(1)}$.

Where: $q^0(1)$ is the quantity of light molecules

[42 groups unrecoverable]

[PART II][B% So that]: $x = 1$ at the beginning of distillation.

Then: $\frac{q'(x)}{q'(1)} = x^{\beta}$.

Where: $q'(x)$ and $q'(1)$

[65 groups unrecoverable]

.....$^0(1)$

and $X_n{}^{\beta} = \frac{q'_n(x_n)}{q'_n(1)}$

[42 groups unrecovered]

[C% if] the identical quantity of [B% lighter]

[52 groups unrecoverable]

NF_6 [iv]

[26 groups unrecovered]

[PART III] Let $a = \frac{x}{1-x}$.

$p = \frac{\text{quantity of light molecules}}{\text{total quantity of molecules in}}$

[12 groups unrecovered]

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[redacted]

Let $p_n(x)$

[15 groups unrecovered]

..... = N.

Then:

[67 groups unrecoverable]

and $p_n(x)$

[9 groups unrecovered]

easily calculate the theoretical

[45 groups unrecoverable]

....._n ".

No. 534[vii] [Signature unrecoverable]

Footnotes: [i] KVANT: ie "QUANTUM"; unidentified covername. Also occurs in NEW YORK's Nos. 961 of 21 June 1943 [redacted] and 1405 of 27 August 1943

[ii] ĒNORMAZ: ie "ENORMOUS" (usually occurs as "ĒNORMOZ"); coverword for the US Atomic Energy Project, but its meaning is clearly restricted to U^{235} in this text and in MOSCOW to NEW YORK No. 349 of 10 April 1945 [redacted]

[iii] Or perhaps "ratio".

[iv] Or "of a chemical".

[v] In the technical part of the message the punctuation of the original has been retained.

[vi] NF_6: Presumably a mistake for UF_6 (uranium hexafluoride).

[vii] Mentioned in NEW YORK's No. 1405 of 27 August 1943 [redacted] - of[i].